

Running head: INTERSTATE 64 LANE REVERSAL CONOPS

Development of a Concept of Operations Plan for Interstate 64 Lane Reversal in  
James City County, Virginia

Alton F. Catlett, Jr.  
James City County Fire Department  
Williamsburg, Virginia

An applied research project submitted to the National Fire Academy as part of the  
Executive Fire Officer Program  
January, 2010

Certification Page

I hereby verify that this paper constitutes my own product, that where the language of others I set forth, quotations so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: \_\_\_\_\_

Alton F. Catlett, Jr.

## Abstract

Effective advance planning by fire departments is a key factor in the successful mitigation of potentially complex emergency incidents. Commonly referred to as preplanning, the concept has been applied to developing plans of action for all types of hazards from structure fires to large sporting events. The problem is the Commonwealth of Virginia has developed detailed plans to provide for one way traffic flow to evacuate the Hampton Roads area of the state should it become necessary during a major event such as a hurricane, and one of the primary routes and exit point is an interstate highway that transects James City County (JCC). The effects of such an evacuation would have profound effects on the provision of local emergency services. This purpose of this Applied Research Project (ARP) was to identify key elements necessary in a concept of operations plan (CONOPS) and to develop a CONOPS for the James City County Fire Department (JCCFD) to use in the event of an order from the Governor of Virginia to implement the lane reversal evacuation. Action research was used to answer the following questions: 1. what is the current Virginia lane reversal plan, and how does it affect JCC? 2. What have key emergency managers and planners identified as specific issues that will impact JCC? 3. What are the current capabilities of the JCCFD to manage major emergency events? 4. What resources are available to the JCCFD to develop a CONOPS specific to a lane reversal event? The procedures used to complete this research included personal interviews, surveys and a literature review. The results of this research included indentifying key elements that would be necessary to be considered in planning, the capabilities of existing local emergency operating plans and facilities, and the creation of a CONOPS and incident command structure (ICS) to use if a lane reversal scenario presents. Recommendations were included that addressed adoption of the CONOPS, training, equipment, and shelter needs.

Table of Contents

Abstract.....3

Introduction.....5

Background and Significance.....7

Literature Review.....10

Procedures.....19

Results.....21

Discussion.....24

Recommendations.....25

Reference List.....27

Figure 1: Interstate 64 Evacuation Route.....14

Figure 2: Interstate 64 Hurricane Gate.....15

Appendix A: ICS Typical Template.....30

Appendix B: JCCFD Lane Reversal CONOPS.....31

Development of a Concept of Operations Plan for Interstate 64 Lane Reversal in  
James City County, Virginia

Introduction

Planning for a major emergency event such as an evacuation of a major metropolitan area during an impending hurricane is an involved task. In Virginia, the Hampton Roads area is particularly vulnerable to hurricane events, due to its location and geography. The existing highway system presents unique challenges, as there are only two primary routes leaving the area separated by the harbor of Hampton Roads. With 1.5 million residents to consider, should a hurricane of significant strength approach the area the Governor of Virginia is empowered by legislation to order mandatory evacuations. Residents would be asked to leave by using the two primary routes of Rt. 460 and Interstate 64 (I-64).

The problem is that the Commonwealth of Virginia has developed detailed plans to provide for one way traffic, or contra-flow, to evacuate citizens on the I-64 route which transects James City County (JCC). In addition, exits and ramps along the highway will be closed by using gates monitored by the Virginia State Police (VSP) and Virginia National Guard (VNG). The first open exit once citizens begin contra-flow evacuation will provide direct access to James City County, which is considered a relatively safe and protected area in all but the most severe of storm intensities. This is exit 234, where evacuees will have their first access to services such as fuel, hospital, hotels, and food establishments. The lead agency for the contra-flow plan Commonwealth is VDOT, which has commissioned studies that estimate as many as 600,000 persons in 150,000 vehicles will honor an evacuation order using the two primary routes of Rt.

460 and I-64. While the intent of an evacuation on the I-64 route is for the primary exit point to be in the Richmond area, the 234 exit is unrestricted and there are no estimates on how many evacuees may elect to make that their destination of choice. This influx of evacuees could dramatically increase the static population of JCC virtually overnight, potentially overwhelming local emergency resources. The effects on road systems, fuel resources, food availability, shelter availability, special needs populations, availability of medical care, and the resulting increase in calls for emergency services are unknown. The purpose of this research project is to identify key elements necessary in a Concept of Operations Plan (CONOPS) to prepare for evacuees, and to develop a CONOPS with incident command system (ICS) template for the JCCFD to use in the event of an order from the Governor of Virginia to implement the lane reversal evacuation.

This ARP will use the action research method using personal interviews, electronic surveys, analysis of prior major events, and a literature review to answer the following research questions:

1. What is the current Virginia lane reversal plan, and how does it affect JCC?
2. What have key emergency managers and planners identified as specific issues that will impact JCC?
3. What are the current capabilities of the JCCFD to manage major emergency events?
4. What resources are available to the JCCFD to develop a CONOPS specific to a lane reversal event?

## Background and Significance

James City County (JCC) is located in southeastern Virginia, and is considered a premier community to live, work and play. It is as old as history in the United States as the Jamestown 1607 settlement is here, and the 400<sup>th</sup> anniversary of Jamestown was just celebrated in a major venue event in 2007. The story of the American firefighter goes back to that colonial period. Those that took risks to save his neighbor's life and property from the common enemy of fire became a respected member of the community, which was a necessity for the survival of all.

One of the primary sources of both tourists and production is the Anheuser-Busch complex made up of a brewery for beer and the adjoining Busch Gardens amusement park. The Busch family brought their business to James City in 1978, and that set the stage for the career fire department that exists today. Fueled by the Busch investment, the county began a rapid growth cycle as spin-off higher income gated communities were developed. Older residents were drawn to the area as a retirement destination, and a steady stream of retirees primarily from northern states began taking up residence. Today the JCCFD operates out of the five stations, with a career staff of 109 firefighters and medics. A full range of services is offered, including advanced life support (ALS) ambulances, technical rescue, dive, water rescue, fire marshal and prevention divisions. This is accomplished by five first due engine companies and five ALS ambulances, two ladder apparatus, and a variety of support vehicles. The department operates under a county manager/board of supervisor form of government.

Although much of the county's 144 square miles consists of developed suburban areas, it has retained a considerable amount of undeveloped agricultural and forest land. As such, it has attracted the attention of many large developers. Demographic analyses show that the county's population increased by more than 28% between 2000 and 2008, making it the tenth fastest-

growing locality in the Commonwealth, as reported by the Weldon Cooper Center for Public Service in January, 2009. The average annual growth rate has been over 3% between 2000 and 2010, with the population expected to grow to more than 64,700 in 2010, and to more than 84,000 by 2030 (University of Virginia, 2009). Planning for the provision of new stations and addition of resources is one of the most important functions a fire department can undertake. Fire and community planners need to be constantly aware of the status of the emergency response system, and have the tools available to make long range strategic decisions about additions or changes to those resources, and have the ability to plan for significant events that may impact the emergency response system. That ability was tested when the Jamestown 400<sup>th</sup> celebration was held and lessons learned are applicable to developing plans for large scale influxes of people such as may happen during a hurricane evacuation of the Hampton Roads area. In an example of large scale collaboration with over 27 individual local, state, and federal agencies, the JCCFD and JCC Police Departments joined in a Unified Command (UC) structure to coordinate over 3,000 emergency personnel to support the event. By using a National Incident Management System (NIMS) model, America's 400<sup>th</sup> Anniversary Combined Public Safety Plan (CPSP) was one of the largest local government controlled national events held in recent memory (CPSP, 2007).

Coastal areas such as Hampton Roads are vulnerable to hurricanes, and the events of recent hurricane seasons have made evacuation a leading emergency management issue. Evacuation has the goal to get as many people out of high-risk areas as quickly and safely as possible (Urbina, 2002). In Virginia, local government carries the responsibility of designing and maintaining emergency plans to provide the initial response to emergency situations. The Code of Virginia designates that each local government entity have a director of emergency



management, and in the case of a county that the director be either a member of the local board of supervisors or the chief administrative officer. In JCC, the director is the county manager who delegates authority as appropriate to the fire chief and emergency management staff. According to the Commonwealth of Virginia Emergency Operation Plan (COVEOP) when a hurricane strikes help may not be immediately available from the state or federal government. It is the responsibility of local government to be prepared to bear the initial responsibility for hurricane response and relief. Local plans and procedures prepared should be developed and maintained to provide for the safety and welfare of citizens until such time as outside assistance is available (Commonwealth of Virginia, [COVEOP] 2007).

The problem addressed in this project is that if a contra-flow evacuation of residents of Hampton Roads is implemented, there will be a sudden influx of evacuees into the JCC area seeking shelter. How many will enter the county, what their impact on local emergency services will be, and how long services will need to be provided are largely unknown. What is known is that injections of large numbers of people in a short time frame to JCC do impact the emergency service system, as was demonstrated by the America's 400<sup>th</sup> Anniversary event. That event produced incident volumes about double of a typical day's response for the JCCFD, and it was held in good weather conditions. Total numbers of attendees were less than 100,000 over a four day period. An evacuation scenario would potentially involve 20,000 to 100,000 persons under potentially poor weather conditions, and under additional stressors such as lack of food, fuel, medical care, and shelter. The purpose and significance of this research is to identify key elements that will need to be addressed in any advance planning effort, and the production of a CONOPS with an adaptable ICS command structure template that can be used to conduct initial operations in JCC in the event of a lane reversal evacuation of Hampton Roads.

This ARP relates to National Fire Academy (NFA) Executive Fire Officer (EFO) curriculum in the Executive Analysis of Community Risk Reduction course by seeking to reduce community risk. Anticipating potential hazards and facilitating interventions is an important goal of every EFO.

This research supports several USFA operational objectives. This includes the objectives of reducing risk at the local level through prevention and mitigation and improving local planning and preparedness.

### Literature Review

A literature review was carried out in relation to the specific research questions, as it related to the problem and purpose statements. This included a review of professional journals and research papers, EFO papers, current local, state and federal emergency operating plans, and Internet searches. It was discovered that the amount of information that was specific to contra-flow evacuations impact on emergency services was limited and narrow in scope, while emergency planning produced voluminous information. The information found is centered on the emergency management aspect of hurricane evacuations, concepts of contra-flow evacuation experiences, emergency planning, and structure of emergency operating plans. Personal and email interviews of key emergency management officials familiar with the specifics of the Virginia contra-flow plan were also conducted, which produced valuable data specific to the problem studied.

The necessity for evacuation prior to major landfall hurricane can be seen in the aftermath of the 1900 Great Galveston Storm and Earlier Disasters along the Gulf Coast at the end of the 19<sup>th</sup> century. In an analysis of the Galveston hurricane which resulted in the loss of over 8,000 lives, Fincher (2000) concluded that disasters should be utilized as lessons that should

be reviewed in order to learn from them. He also concluded that the biggest problem is how to reach the at risk population with timely information so that they could react, and that better highway systems were needed for quicker evacuations.

Urbina found that the more recent hurricanes Georges in 1998 and Floyd in 1999 found that mass evacuations using primary highway systems needed precise coordination to be effective, or nothing but large traffic jams would result. It was the result of traffic issues during those hurricanes that state and federal highway agencies began taking a more active role in planning for an effective evacuation. FEMA through its National Hurricane Plan (NHP) coordinates special teams called the Evacuation Liaison Team (ELT) and the Hurricane Liaison Team (HLT). The ELT is comprised of key highway and emergency management specialists which advise and facilitate information vital to evacuation plans, especially those involving multi-state events. They also provide specific information on the gathering and dissemination of critical real-time information in evacuation events, using a modeling program called the Evacuation Traffic Information System (ETIS). The HLT is another group of emergency management and other state and federal specialists who deploy to the National Hurricane Center to assist with coordination with hurricane threatened areas (Federal Emergency Management Agency [FEMA]). Additional problems such as unanticipated volumes of evacuees, inadequate signage, and inadequate traffic control were also identified by some jurisdictions during Floyd, including in Virginia the Hampton Roads area. However, jurisdictions in Georgia and South Carolina using ETIS and information technology resources had success with implementation of contra-flow evacuations (FEMA). With that success combining ETIS and contra-flow, emergency managers embraced the contra-flow concept in many areas.

Contra-flow refers to the conversion of one or more of the lanes of a highway to travel in the opposite direction traffic normally flows, resulting in one-way travel for all lanes increasing travel capacity without having to add lanes. It is not a new concept, having been routinely used in special situations for usually short distances at major sporting events or similar mass-gathering venues. It had also been part of some major cities plan for mass evacuation in the event of nuclear missile attack. Improvements in information gathering and technology continued, and the need for more coordination between different agencies and methods of information sharing became apparent. Experimentation with various technologies to automatically collect large volumes of information were also underway, including various types of traffic counters, closed circuit television, aerial photography and other methods. Integration of the traffic information with weather information gave emergency managers more tools to make decisions with (Urbina).

Hurricanes Katrina and Rita demonstrated the potential effectiveness of contra-flow evacuation routes. However, traffic mishaps and breakdowns can quickly turn a freeway into a gridlock situation, potentially stranding thousands of evacuees and cutting off the evacuation route for others. It also demonstrated that contingencies must be prepared for, as in stockpiles of water, food, and medicine to those trapped during evacuation (Brodie, Weitzien, Altman, Blendon, and Benson, 2006). In post hurricane reviews of the Rita evacuation, various federal commissions' recommendations for improvement were cited. The technology of geographic information systems (GIS) was particularly singled out as a vital tool for emergency managers (Environmental Services Research Institute [ESRI], 2006). GIS is a technology that relates graphical features with tabular data to provide solutions to a particular problem or situation. The resulting graphical representation can relate many types of data in a mapping format that conveys the information in a visually attractive manner that is simple to understand. When the two types

of data are related or joined, spatial analysis occurs. Groups of related information are called layers. The combination of various layers creates a thematic map, and by use of coloring and other graphic techniques spatial patterns can be clearly evident (Parker and Asencio, 2008). By collecting and disseminating data and relating it to the highway system, more informed decisions can be made by emergency managers for such things as the most efficient route, available fuel, food, and emergency medical services (EMS), and route closures (Lindsey, 2009).

In the Commonwealth of Virginia, the Virginia Department of Transportation (VDOT) is responsible for lane reversal evacuation planning for the vulnerable Hampton Roads area. The department has developed and tested advanced strategies and information technology integration in developing a lane reversal plan. The VDOT plan is a component of the Commonwealth of Virginia Emergency Operations Plan (COVEOP). The Governor of Virginia is responsible for making the final decision on any lane reversal implementation, as well as any call for mandatory evacuations. In the VDOT plan, a VDOT Incident commander (IC) is appointed to be in charge of the Transportation Emergency Operations Center (TEOC) to coordinate the lane reversal once authorized by the Governor. The TEOC coordinates a wide variety of information technology to monitor the evacuation, including monitoring of roadways, traffic monitoring, and integrated voice recognition (IVR) system to provide information to the 511 telephone number, and GIS and website functions to flow information to localities, other state agencies, the federal government, and the public (COVEOP).

One of the most important steps that can be taken to reduce casualties is comprehensive planning. Planning can be a powerful tool for building resilience and reducing losses from natural disasters (Burby et al. 1999). In Virginia as in other states, local government must rely on its own resources in the period immediately after a major disaster type event. In the VDOT lane reversal plan, the first exit point for evacuees from Hampton Roads would give direct access to James City County and its

neighbor York County by way of the Route 199 parkway. While the intent on allowing unrestricted exiting of evacuees is to allow access to food, fuel, medical care and lodging, local government must be prepared for an unknown number of evacuees who decide not to re-enter the interstate for whatever reason. This includes being unable to re-enter due to traffic gridlock, fuel unavailability, mechanical problems, and related issues.

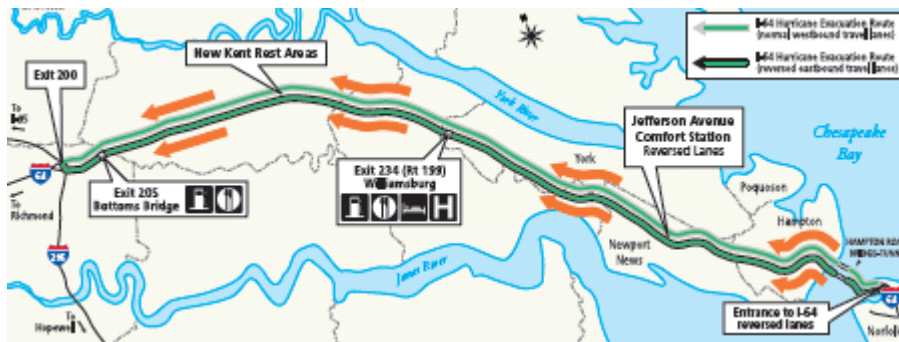


Figure 1. Interstate 64 Evacuation Routing

Once the evacuees take the exit, they now will be the responsibility of the local jurisdiction they find themselves in. According to the COVEOP, local authorities have primary responsibility for managing emergencies. This includes police, fire, emergency medical and health, emergency management, public works, environmental response, and other personnel are often the first to arrive and the last to leave an incident site. When local resources, mutual aid and other capabilities are overwhelmed, local officials may request assistance from the state. When state resources are overwhelmed, the Governor may request federal assistance under a Presidential disaster or emergency declaration (COVEOP).

In the event of a major evacuation of Hampton Roads and the arrival of a major hurricane, federal assistance coordinated by FEMA is likely. The establishment of a Joint Field Office (JFO) of federal, state and local officials would then take over coordination of the disaster response. This could take up to 72 hours to occur, so localities need to be prepared to bear the initial responsibility for the safety and welfare of citizens and evacuees until help can arrive.

Local plans of action should be developed and maintained to provide for this reality, as according to the Virginia plan the development of emergency response capabilities and the direction and control of local emergency operations when a hurricane strikes are the direct responsibility of local governments (COVEOP).

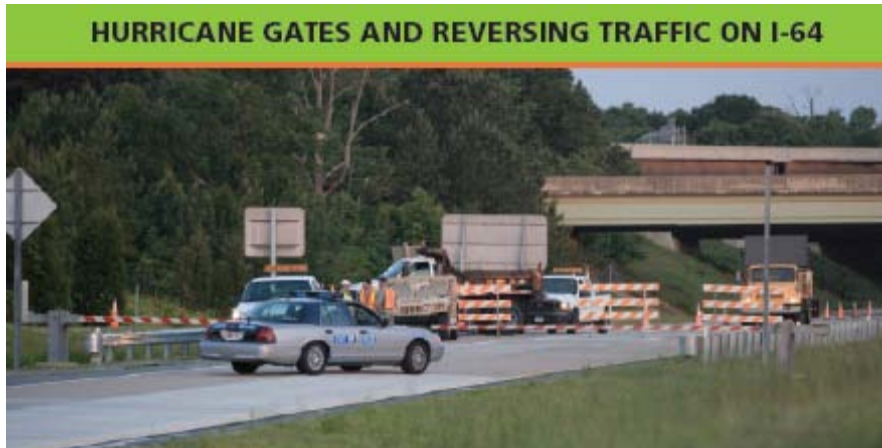


Figure 2. Hurricane Gates on Interstate 64

There is a wealth of tools, information, and actual experiences of other localities that local planners can use to identify key areas of concern and to write a CONOPS plan to guide and coordinate JCCFD chief officers and local emergency management officials to prepare for an actual operational event. In the event of a storm condition that may warrant the possibility of lane reversal, the CONOPS will be the foundation for an actual Incident Action Plan (IAP) specific to the actual circumstances, that can be used in an operational period until state and federal resources can arrive. According to Zimmerman (2002), this type of planning action is called preplanning for a no notice evacuation. Not only is it necessary, but the actual process used and its results must be updated on a regular basis, preferably annually, with the focus on preparedness. The preplan process helps to identify issues so that they can be resolved before an

actual event, and strengthens the plan and makes it more likely to be actionable and successful.

The plan should take an all hazards approach to retain flexibility for other types of incidents such as terrorist attacks which could also call involve evacuees. Any plan should also follow the National Incident Management System (NIMS) structure and have an incident command system (ICS) structure. Key principles and elements should be identified in a concept of operations (CONOPS) using NIMS structures. The CONOPS would contain high level issues and outline a command structure, and would become the basis for an event specific IAP. Once an actual event is being worked, the IAP becomes the basis for advanced planning for the specific event at hand. In their published materials, the U.S. Department of Transportation Federal Highway Administration (USDOT/FHA) cite key components of any plan produced to include the context of the situation, that it take a all hazards approach, the importance of command structure, that stakeholders be identified, the role of transportation, and to plan for all evacuation phases (Zimmerman).

Much has been published elaborating on areas of concern and sources of tools to assist with those areas and planning. The federal government provides evacuation guidance, and after the Katrina experiences produced the publication by FEMA *State and Local Guidance 101*. This publication provides guidance on evacuations, sheltering, resources, and needs of evacuees (Brodie, et al). Destinations and sheltering need to be a priority of evacuation planners. They must be identified, assessed and prepared in advance of being needed for no notice evacuations such as would happen in most hurricane situations. When necessary, a refuge of last resort may be designated by either an at risk or host locality. These last resort areas are only a temporary safe haven from storm conditions, and services such as food, water, and medical care may not be available. The term shelter refers to a facility or area either in a coastal locality or further inland,



for people displaced by a major hurricane, and may provide cots, blankets, food, and comfort supplies (COVEOP).

Medical care during catastrophic events needs to be structured to take into account the consequences of disruptions, such as the temporary shortage of medical resources, supplies, equipment, facilities and personnel. Triage and care will need to be provided in place without any real expectation of immediate transportation. Disaster officials need to be ethically and legally obligated to act as responsible stewards of scarce public resources (Larkin, 2003).

Special types of evacuees may very well present themselves, and the locality needs to be prepared for those that are transportation disadvantaged either by disability, need for medical devices, or nursing care such as those persons in nursing facilities. Existing nursing home facilities in the host community should be incorporated into emergency planning, as a potential resource (Laditka, 2008).

FEMA provides a wealth of information, guidance, publications, software, instruction, job aids, and technical assistance to local governments, states, and other federal agencies. The National Incident Management System (NIMS) is a systematic way for all levels of government to work together at all types of emergency events. NIMS works the National Response Framework (NRF) which provides for national level policy, structure and mechanisms used during emergency events. NIMS provides for an all hazards Incident Command System (ICS) adaptable to any type and size of emergency (FEMA). Local, state and federal planners and officials can access specific training material, software, instruction, and support to aid in the production of CONOPS, ICS structures, IAPs, and other necessary guidance. Software of particular distinction is called HAZUS-MH, a GIS product and portal which is specially adapted for emergency management of events such as hurricane evacuation. Documents referenced for

this paper from FEMA include HAZUS-MH: FEMA's Gold Standard for Mitigation and recovery Planning; Animals in Emergencies; Use of HAZUS-MH to Support Individual Assistance Program; Using HAZUS-MH for Comprehensive Planning. Support for shelters and evacuation is available from FEMA in the following publications: Community Wind Shelters: Background and Research; All You Need To Know To Use Hurrevac Effectively; Incorporating Information from Comprehensive Hurricane Evacuation and Property Loss Studies into Community Emergency Plans and Programs; Evacuee Support Planning Guide; Evacuee Support Concept of Operations Template; Preparing for Disaster for People with Disabilities and other Special Needs (FEMA).

Several key emergency managers involved with the development of the Virginia lane reversal plan were interviewed and were asked to respond to a set of questions. Their key responses are summarized as follows. Kathleen Hale, Director of Emergency Management for JCC, sees the current Virginia plan as a creating a unique set of circumstances for JCC. Concerns were raised about the unknown amount of traffic that would exiting at mile marker 234, and the lack of estimates about just how many evacuees may be expected to not re-enter the Interstate. She states that production of a plan by JCC to prepare for the potential of evacuees seeking shelter that may not be readily available as paramount goal of her department (K. Hale, personal communication, October 15, 2009). Robert Ryalls, Support Services District Chief of JCCFD raised similar concerns. He cited the need for a well trained and supported planning section as a key goal for JCCFD. Planning should also be focused on identifying what locations in JCC could be used for sheltering within easy access from the interstate, including shelters of last resort. As power may be a concern, hotels and motels and other suitable buildings that have generator back-up power should be identified (R. Ryalls, personal communication by email, November 4, 2009).

Frank Cheatham, Virginia Office of Emergency Medical Services HMERT Coordinator, also sees the exit 234 as having the potential produce a large influx of vehicles and people that could overload area resources. He noted that communications with all assets to be extremely important, as the Virginia plan tasks JCC with being a primary communication point in JCC Emergency Operations Center (JCC EOC). He also sees various similarities between the ICS command structure that was used during the America's 400<sup>th</sup> Anniversary and one to be developed for the JCC local response to lane reversal, just with the necessary adjustments (F. Cheatham, personal communication by email, October 29, 2009). Wallace Twigg, Virginia Department of Emergency Management, Tidewater Regional Coordinator, also cites the importance of the communication function. As the JCC EOC is tasked with various components of the emergency communication needs of mutual aid units on Interstate 64, extra staffing for this in the EOC is sure to be needed. He also identifies the local need in JCC to identify refuges of last resort (W. Twigg, personal communication by email, November 3, 2009).

### Procedures

This researcher used the action research method to answer the identified research questions for this ARP. A literature review pertinent to the elements of the research questions was conducted. Using the physical and online resources of the Learning Research Center (LRC) at the National Emergency Training Center in Emmitsburg Maryland, information was gathered on a variety of relevant topics. The research included journals, books, research and white papers, and published standards and guidelines from recognized authorities in emergency management.

Other library and internet resources were also used, including personal and email interviews with key emergency management officials involved with the Virginia lane reversal plan. Copies of the applicable current emergency plans were obtained, including the

Commonwealth of Virginia Emergency Operations Plan, VDOT lane reversal plan, and associated appendixes and supporting documents.

The first step after gathering and disseminating research was to analyze the data to have a clear understanding of the concepts of contra-flow lane reversal, and to determine how Virginia officials had designed their COVEOP Annex B plan. Particular attention was given to the components of the plan that concerned access points of Interstate 64 to James City County. Special notation was also given to any specific instructions included in the COVEOP that concerned JCC.

Interviews with key Virginia and local planners that had been involved with the COVEOP were held, with notation given to key issues they identified, particularly as it concerned evacuee access to JCC and any specific concerns they had about the needs of those evacuees should they find themselves needing services while in the JCC jurisdiction.

An internal look into the capabilities of the JCCFD and Emergency Management Divisions was undertaken to see what experience personnel had with developing CONOPS, IAPs and related planning activities. The capabilities of the JCC Emergency Operations Center (JCCEOC) was also evaluated, as well as the current JCC Emergency Operations Plan. This included prior experiences with EOC activations, prior major events, and ongoing training of personnel. A review of the operational capabilities of the JCCFD was studied, including mutual aid agreements with neighboring localities, and procedures for requesting state and federal resources.

Use of the NIMS concepts of planning was reviewed, with particular attention to review of FEMA and USDOT/FHA guides on preplanning and development of CONOPS specific to

evacuations, contra-flow lane reversals, and related pertinent materials, software and job-aids that could assist in both planning and managing a major event.

The limitations noted was the lack of published research available specific to other localities experiences with the effects of evacuees on local emergency services who are seeking refuges of last resort as a result of contra-flow lane reversal evacuations. However, there was sufficient research available showing the success and viability of contra-flow evacuations, and the need for refuges of last resort during hurricane evacuations.

### Results

The literature review and analysis of the Virginia COVEOP and the VDOT lane reversal plan provided the answers to the first research question concerning the plan specifics. The plans are specific to hurricane events that may affect the Hampton Roads area of Virginia. The plans are designed to provide for effective evacuation routes out of the Hampton Roads area should it be determined that a mandatory evacuation of those areas be needed. The key feature of the plans is the option to provide for a lane reversal of Interstate 64 which is one of two primary evacuation routes for the area. The goal of a lane reversal, when and if authorized by the Governor of Virginia, is to increase capacity and facilitate the evacuation. Hurricane gates already in place on the interstate are lowered to control traffic flow and police and National Guard units are in place to monitor. Once on the interstate, traffic cannot exit unless at authorized rest stops and exit points, the primary terminus being exit 200 in the Richmond area in order to access Interstate 95 and services in that area. On examination of the plan, it was found that the Interstate 64 route traverses James City County and that there is a secondary authorized exit point at mile marker exit 234. The primary purpose of that exit is to allow traffic to exit to access fuel, food, medical care and lodging. Exit 234 gives traffic direct access to JCC and its

primary and secondary road systems. It was also noted that there are no restrictions on the traffic, so that an evacuee could very well make JCC their final destination.

The second research question asked key emergency professionals familiar with the plan what they saw as specific issues that JCC could expect. The common theme was that there is a limited amount of shelter space identified in the area. It was also noted that existing hotel and lodging space is usually near capacity during the hurricane season, due to the popularity of the area as an established vacation destination. As the numbers of evacuees and vehicles are unknown, it is the assumption that the numbers will greatly exceed space, and that refuges of last resort will likely be needed. The literature review results on refuges of last resort describe them as temporary in nature, and if there is not significant damage in the coastal area evacuees could be allowed to return to their homes minimizing the effects on the host jurisdiction. However, if they cannot return in a timely manner, that there will be immediate needs for food, fuel, shelter, and medical care. There would also be impacts of special needs populations and even the needs of pets, as most evacuees will bring their animals with them. The managers also identified that the JCC EOC has been identified in the Virginia lane reversal plan as being the local communications control point for mutual aid emergency service units operating in the western portion of the lane reversal, including James City County and neighboring jurisdictions. The JCC EOC would most likely need supplemental staff and resources to handle the added communication needs of the mutual aid resources.

Examination of the JCC EOC, and JCCFD EOP, equipment, staff and facilities answered the third ARP question concerning current department capabilities. James City County has a modern well equipped, hardened facility which is collocated next to the JCC Emergency Communications Center. Recently renovated, the EOC has modern communications, computer,

video communications, backup power generation and support equipment. The JCC Emergency Management Division regularly trains county and other volunteer staff to operate the EOC.

There are defined roles and designated staff and back-up staff to accommodate all functions of a modern EOC operation. There is a standard all hazards emergency operations plan, which is reviewed on a regular basis. The JCCFD is the lead county agency, and uses NIMS compliant ICS procedures to manage emergency events, both in the field and in the EOC. The JCC EOC has operated large major events, including the America's 400<sup>th</sup> Anniversary event in 2007.

During that time, the JCC EOC was the command center for a local controlled Unified Command (UC) that oversaw 27 local, state and federal agencies to manage the event. The 2007 Combined Public Safety Plan was produced under the leadership of the JCCFD, and was a fully developed and structured NIMS compliant plan. The JCCFD has a five fire station structure, and operates engine, ladder, rescue, technical rescue, ambulance transport and comprehensive advanced life support services. It has first due and reserve equipment sufficient for normal operations, and has mutual aid agreements in place with neighboring jurisdictions and the Commonwealth of Virginia.

The fourth ARP question concerns resources to develop a CONOPS specific to a lane reversal event. The JCCFD has staff and resources in house to develop plans as needed for emergency events. Training and resources received as a result of the America's 400<sup>th</sup> Anniversary event, as well as established procedures for designing IAP, are all available with current staff. As a result of this research, additional tools available from FEMA and the USDOT/FHA specific to evacuations and lane reversal planning was obtained. Review of that information enabled the creation of a draft CONOPS for lane reversal should that occur, as well as a model ICS command template to be used. The draft CONOPS and ICS template has been

submitted to the fire chief of JCC for review and recommendation for adoption. The target date for adoption is the start of the next hurricane season, June 1st 2010. The plan would become part of the JCC EOP for use during a lane reversal event. A copy is in appendix B of this ARP.

### Discussion

The results of this applied research project demonstrated the necessity for planning to achieve successful outcomes in mitigating emergency events. This is particularly true for hurricane events due to their dynamic nature. Urbina stated “Hurricanes cannot be controlled, but vulnerability to their effects can be reduced through preparedness and effective evacuations” (p.12). Planning also needs to be done in advance before the crisis moment occurs. As stated in the USDOT/FHA guidance on no-notice evacuations, “Once a no-notice incident occurs, planners will have insufficient time to tailor their response to the particular incident but must be able to act quickly to mitigate its effects” (Zimmerman, p.16). Planning also needs to follow a process, and be structured to follow NIMS guidelines with standardized ICS command and control assignments.

This researcher’s interpretation of the results is that there is a well coordinated evacuation plan for Hampton Roads managed at the state level. Further, if the lane reversal component of the current plan is implemented, there will be a significant impact to JCC by a steady flow of evacuees taking the mile marker 234 exit. While the number of evacuees that will come here is not known, it can be expected that those evacuees will seek shelter, including food, water, fuel and medical care. If those resources are not available, or not available in sufficient quantity, the disaster situation they were leaving may very well result in the jurisdiction they relocate to. The jurisdiction needs to have a plan in place to respond to that eventuality, which will protect both the evacuees and the resident citizens of the jurisdiction. Advance planning can identify areas for



evacuees to be directed to, and contingencies for the provision of supplies to those areas can be made. Estimates of the amounts of additional resources can also be planned for, including resource lists of where critical supplies are located, including redundancy sources.

The implications for the JCCFD and JCC is that while disaster situations are always difficult events, the organization does have the knowledge, staff, and tools at its disposal to successfully plan for this and similar events. Without advance planning for major events, service disruptions providing routine emergency operations could result. Having a plan in place will enhance the organization's core responsibility to maintain services to resident citizens. It will also enable it to recognize what additional steps it will need to take to for the added responsibility it will bear should it become a host jurisdiction during an evacuation event.

### Recommendations

The first recommendation is to review the draft CONOPS and ICS template at the senior staff level of the department, with modification as necessary followed by adoption. Once initial adoption of the CONOPS, a planning team and chief should be selected to begin the additional research necessary to develop resources the department will need. Stakeholders need to be identified, including neighboring jurisdictions, and included in the planning process. A particular focus needs to be on identifying shelter locations, areas for refugees of last resort, and estimates of support supplies, staff, and equipment needed to service those locations identified.

This research also indicated that a robust communication component would be needed in our EOC function, as identified by key emergency managers familiar with the current Virginia plan. A review of our communication capabilities should be performed, in the context of a lane reversal evacuation scenario. Recommendations as a result of that review should then be included in the lane reversal CONOPS.

There is a wealth of new tools in the form of planning resources available for evacuation situations that can have positive uses for many types of emergency situations. One such tool involves advanced use of GIS software in the management of emergency events. This research showed that agencies we will be involved will be producing and collecting many forms of data that could be useful to JCC in an emergency event. A review of our GIS capabilities in the EOC setting should be performed, including training scenarios involving EOC assigned staff. This can be a valuable asset in routing evacuees, supplies, and emergency response, as well as providing documentation of events.

Future readers of this research will find that there are many resources available for disaster preparedness. A central location for access to those resources can be found at the FEMA website <http://www.fema.gov/prepared/links.shtm>

## Reference List

- Brodie, M., PhD., Weltzien, E., Altman, D. PhD., Blendon, R.J. PhD., Benson, J., MA., (2006). Experiences of hurricane Katrina evacuees in Houston shelters: Implications for future planning. *American Journal of Public Health*, Vol 96, No. 5.
- Burby, R.J., Beatley, P.R., Berke, R.E., Deyle, S. P., French, D.R. Godschalk, E.J., Kaiser, J.D., Kartez, P.J., May, R., Olshansky, R., Paterson, G., Platt, R.H. (1999). Unleashing the power of planning to create disaster-resistant communities. *Journal of the American Planning Association*, 65, (3):247–258.
- Commonwealth of Virginia Emergency Operations Plan (COVEOP). (2007). Retrieved October 12, 2009, from <http://www.vaemergency.com/library/plans/COVEOPBasicPlanSeptember2007version12.10.2009.pdf>
- Environmental Systems Research Institute. (March 2006). *GIS technology and applications for the fire service* [Electronic version]. Retrieved April 15, 2009, from <http://www.esri.com/library/whitepapers/pdfs/fire-service-gis-applications.pdf>
- Federal Emergency Management Agency., *FEMA NIMS resource center.*, Retrieved January 10, 2010 from <http://www.fema.gov/emergency/nims/>
- Federal Emergency Management Agency., *ICS resource center.* Retrieved January 10, 2010 from <http://www.training.fema.gov/EMIWeb/IS/ICSResource/index.htm>
- Federal Emergency Management Agency., *HAZUS resources.* Retrieved January 10, 2010 from [http://www.fema.gov/plan/prevent/hazus/hz\\_resources.shtm](http://www.fema.gov/plan/prevent/hazus/hz_resources.shtm)
- Federal Emergency Management Agency., *Community wind shelters.* Retrieved January 10, 2010 from <http://www.fema.gov/library/viewRecord.do?id=1972>

Federal Emergency Management Agency., *Everything you need to know about hurrevac.*

Retrieved January 10, 2010 from

<http://www.fema.gov/library/viewRecord.do?id=2136&fromSearch=fromsearch>

Federal Emergency Management Agency., FEMA library, topic evacuation. Retrieved January

10, 2010 from <http://www.fema.gov/library/resultResourceRecord.do>

Federal Emergency Management Agency., (2000). *Final report: Hurricane Floyd assessment -*

*review of hurricane studies utilization and information dissemination.* Post, Buckley,

Schuh and Jernigan Inc., Tallahassee, Fla.

Fincher, Lew. (2000). *The 1900 great Galveston storm and earlier disasters along*

*the Gulf Coast-Have we learned our lesson yet?.* Centennial of the 1900 Galveston

Storm, National Hurricane Conference, Tallahassee, Florida.

Larkin, G.L., Arnold J., (2003). Ethical considerations in emergency planning, preparedness, and

response to acts of terrorism. *Prehospital disaster medicine.* 2003:18:170-178.

Laditka, S.B., Laditka, J., Xirasagar, S., Cornman, C., Davis, C., Richter, J., (2008). Providing

shelter to nursing home evacuees in disasters: Lessons from hurricane Katrina. *American*

*Journal of Public Health* Vol 98, No 7. 1288-1293.

Parker, R.N. and Asencio, E.K. (2008). *GIS and spatial analysis for the social sciences: Coding,*

*mapping, and modeling.* New York: Routledge Press.

University of Virginia, Charlottesville, Weldon Cooper Center for Public Service. (January

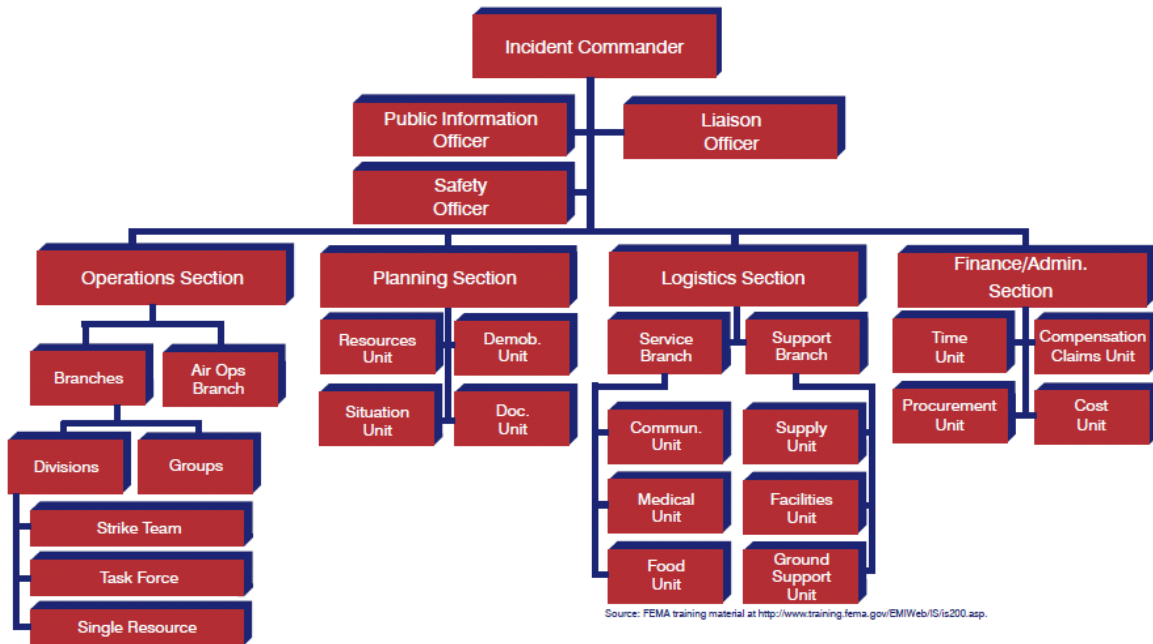
2009). *Total population estimates for Virginia counties and cities.* Retrieved March 26,

2009 from

<http://www.coopercenter.org/demographics/POPULATION%20ESTIMATES>

- Urbina, E.B., (2002). A state-of-the-practice review of hurricane evacuation plans and policies (Louisiana State University and Agricultural and Mechanical College). Abstract retrieved October 16, 2009, from [etd.lsu.edu/docs/available/etd-0418102-140236/unrestricted/Urbina\\_thesis.pdf](http://etd.lsu.edu/docs/available/etd-0418102-140236/unrestricted/Urbina_thesis.pdf)
- Virginia Department of Transportation. (2009)., Lane Reversal Plan., Retrieved October 13, 2009 from [http://www.vaemergency.com/library/plans/hurrplan/AnnexB\\_Evacuation-Appendix-](http://www.vaemergency.com/library/plans/hurrplan/AnnexB_Evacuation-Appendix-)
- Wolshon, Brian (2001). One-way-out: Contraflow freeway operation for hurricane evacuation.[Electronic version]. *American Society of Civil Engineers*. Vol.2,
- Zimmerman, C., Brodesky, R., Jordan, K., *Using highways for no-notice evacuations*. Department of Transportation, Federal Highway Administration, Office of Operations., Retrieved October 13, 2009 from <http://ops.fhwa.dot.gov>

# Appendix A



## Appendix B



# James City County Fire Department

## Interstate 64 Lane Reversal Concept of Operations Plan

### Lane Reversal CONOPS

#### Preparing our County and Maintaining Critical Services When the Evacuees Take the Exit

### **Background and Significance**

The Hampton Roads area is a designated high risk for a difficult evacuation scenario during a major category 3, 4 or 5 hurricane scenario. Those residents have only two choices of routes to leave the area, one being Interstate 64. The Virginia Department of Transportation (VDOT) and the Virginia Department of Emergency Management (VDEM) adopted in 2008 an Interstate 64 'lane reversal plan' for routing traffic westbound during a mandatory evacuation of Hampton Roads upon order of the governor. Gates have been installed and tested at all interstate exits between the evacuation areas all the way to Interstate 295 in Richmond. Their plan is operational for the 2009 hurricane season.

*James City County (JCC) exit 234 is the only open exit in the 71 mile lane reversal evacuation route until it reaches I-295 at exit 200. A coastal storm over 50 miles away from us could result in large numbers of evacuees and vehicles to enter James City County at the 234 mile post exit at Lightfoot.*

### **Vision**

To provide a safe environment for hurricane evacuees, while maintaining critical emergency services to our citizens.

### **Risk Issue**

Our county has a normal population of 70,000, and during the summer season there are usually as many as 30,000 additional visitors to Busch Gardens, Jamestown 1607, and Colonial Williamsburg. Provision of emergency medical services (EMS) and fire/rescue services can be a challenge even during a normal summer season. The additional risk that the VDOT lane reversal plan places on us as a county will be significant. The Hampton Roads area has 1.5 million people, and VDOT estimates that during a full evacuation scenario up to 400,000 people and 175,000 vehicles will use the I-64 evacuation route. Due to the fact we are equidistant on the route to Richmond, and we have a hospital, service stations, and various restaurants and hotels at exit 234, it was determined by VDOT to allow evacuees to exit at mile marker 234 Lightfoot if they require services. How many vehicles and people will actually stop here is unknown, however it is estimated by VDEM to be as many as 90,000, and could be more. It is also unknown how many may decide to stay here and weather the storm, in any way they can. The impact on our fire and EMS by these evacuees could overwhelm our ability to provide even basic services to them or to county citizens.

### **Goal**

County citizens, visitors and displaced evacuees will have reasonable access to necessary emergency services within the capabilities outlined in a hurricane emergency operations plan. Continuity of operations of county government will be maintained, and coordination with regional, state, and federal resources will be facilitated. The resulting plan will follow the unified concept, following the guidelines of the National Incident Management System (NIMS).

### **Objective**

Having an all hazards emergency operations plan to deal with the impacts of hurricane emergencies is a core component of emergency planning. Having a NIMS compliant plan will facilitate recovery of county funds expended during a declared emergency, by having documentation components built into the plan. By June 1, 2010, an all hazards hurricane emergency operations plan will be operational, with the goal of providing basic shelter as a refuge of last resort, and to reducing deaths and injuries to citizens, visitors, and employees of James City County that may occur from such incidents.

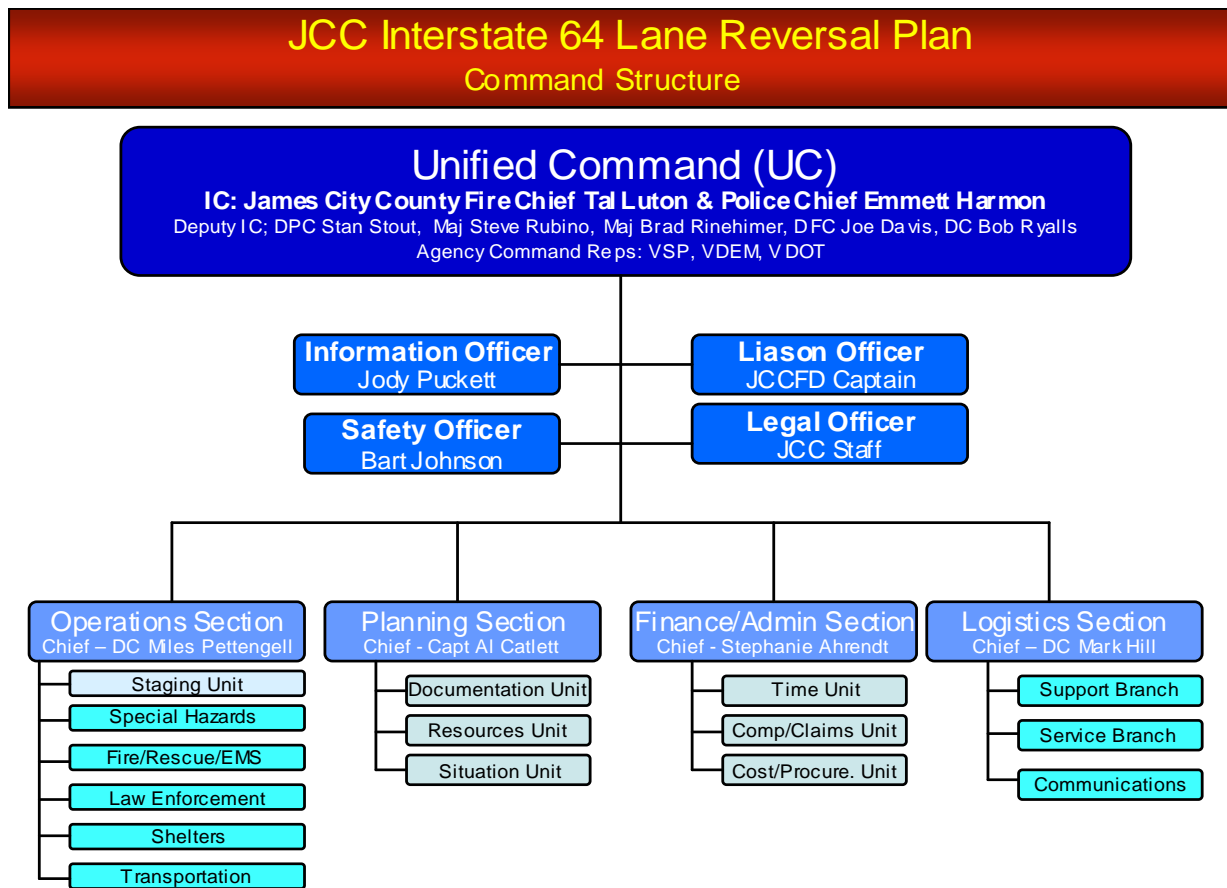
## Lane Reversal CONOPS

**Upon Activation of the JCC EOC for Hurricane Events, All Designated EOC Assigned Staff Are to Respond to the EOC Prepared for Sustained Operations**

### 1. Command Structure

Command structure will follow standard NIMS operating principles, and will operate under a robust ICS.

Initial plan structure



**Command Structure Will Be Expanded As Necessary by the Incident Commander**



**2. Stakeholders**

These agencies will be contacted to respond authorized representatives to the JCC EOC as requested by the IC

American Red Cross  
Sentara Williamsburg Regional Medical Center  
Riverside Regional Medical Center  
Life-Evac  
Virginia State Police  
United States Coast Guard  
Virginia Department of Emergency Management  
Virginia Office of Emergency Medical Services  
Virginia Department of Transportation

Virginia Peninsula Regional Jail  
College of William & Mary  
City of Williamsburg Fire Department  
York County Fire Department  
Henrico County Sheriffs Office  
New Kent County Sheriffs Office  
New Kent County Fire Department  
Federal Emergency Management Agency

**3. Initial Operations and Situational Awareness**

Situational awareness of the status of the hurricane strength and movement are to be monitored and relayed to the IC as updated information is received. Contact with the VDEM liaison as to the status of evacuation preparations and potential timeline of evacuation orders will be essential. Status checks and inspection of designated refuges of last resort are to be verified, confirmation of supply resource availability, and all JCC operational equipment are to be checked and verified.

**4. Advance Planning**

Planning section will initiate specific Incident Action Plans (IAP) as instructed by the IC as required.

**5. Communications**

Logistics section will verify all communication links are operational, including designated mutual aid